

In the claims:

Claims 7, 9, 17, 19, 27 and 29 of claims 1-34 are amended.

New claims 35-43 are added.

1 1. (Original) A spin valve transistor comprising:
2 an emitter;
3 a collector;
4 a base between the emitter and the collector;
5 a spin valve including:
6 a ferromagnetic free layer structure;
7 a self-pinned antiparallel (AP) pinned layer structure; and
8 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
9 structure; and
10 the base comprising at least said free layer structure.

1 2. (Original) A spin valve transistor as claimed in claim 1 wherein the base
2 comprises the free layer structure, the self-pinned AP pinned layer structure and the spacer layer.

1 3. (Withdrawn) A spin valve transistor as claimed in claim 1 wherein the base
2 comprises the free layer structure, the emitter comprises the AP pinned layer structure and the
3 spacer layer is located between the base and emitter.

1 4. (Original) A spin valve transistor as claimed in claim 1 wherein the self pinned
2 AP pinned layer structure comprises:
3 a ferromagnetic first antiparallel (AP) pinned layer;
4 a ferromagnetic second antiparallel (AP) pinned layer;
5 a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP
6 pinned layers;
7 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a
8 positive magnetostriction; and
9 the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to
10 a head surface of the spin valve transistor for self pinning the AP pinned layer structure.

1 5. (Withdrawn) A spin valve transistor as claimed in claim 4 wherein the cobalt iron
2 is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 6. (Original) A spin valve transistor as claimed in claim 4 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 7. (Currently Amended) A spin valve transistor ~~as claimed in claim 4 further~~
2 comprising:

3 an emitter;

4 a collector;

5 a base between the emitter and the collector;

6 a spin valve including:

7 a ferromagnetic free layer structure composed of iron (Fe);

8 a self-pinned antiparallel (AP) pinned layer structure;

9 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
10 structure; and

11 the free layer structure interfacing the spacer layer;

12 the base comprising at least said free layer structure;

13 the self pinned AP pinned layer structure including:

14 a ferromagnetic first antiparallel (AP) pinned layer;

15 a ferromagnetic second antiparallel (AP) pinned layer; and

16 a nonmagnetic antiparallel coupling (APC) layer located between the first and
17 second AP pinned layers;

18 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;

19 the second AP pinned layer including:

20 an iron (Fe) film;

21 [[said]] a cobalt iron (CoFe) film[[;]] with a positive magnetostriction;

22 the iron (Fe) film being located between and interfacing the APC layer and the
23 cobalt iron (CoFe) film; and

24 the CoFe film having a magnetostrictive anisotropy field that is oriented
25 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
26 layer structure.

27 the free layer structure being composed of iron (Fe) and interfacing the spacer layer.

1 8. (Withdrawn) A spin valve transistor as claimed in claim 7 wherein the cobalt iron
2 is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 9. (Currently Amended) A spin valve transistor as claimed in claim [[8]] 7 wherein
2 the cobalt iron (CoFe) film is $\text{Co}_{50}\text{Fe}_{50}$.

1 10. (Original) A spin valve transistor as claimed in claim 9 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 11. (Withdrawn) A spin valve transistor as claimed in claim 4 further comprising:
2 the second AP pinned layer being composed of iron (Fe);
3 the first AP pinned layer including:
4 first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer
5 layer;
6 said cobalt iron (CoFe) film; and
7 the cobalt iron (CoFe) film being located between and interfacing the first and
8 second iron (Fe) films.

1 12. (Withdrawn) A spin valve transistor as claimed in claim 11 wherein the cobalt
2 iron film is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 13. (Withdrawn) A spin valve transistor as claimed in claim 12 wherein the cobalt
2 iron film is $\text{Co}_{50}\text{Fe}_{50}$.

1 14. (Withdrawn) A spin valve transistor as claimed in claim 13 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 15. (Original) A magnetic head assembly comprising:
2 a write head;
3 a read head adjacent the write head;
4 the read head including:
5 ferromagnetic first and second shield layers; and
6 a spin valve transistor located between the first and second shield layers;
7 the spin valve transistor comprising:
8 an emitter;
9 a collector;
10 a base between the emitter and the collector;
11 a spin valve including:
12 a ferromagnetic free layer structure;
13 a self-pinned antiparallel (AP) pinned layer structure;
14 a nonmagnetic spacer layer between the free layer structure and the AP
15 pinned layer structure; and
16 the base comprising at least said free layer structure.

1 16. (Original) A magnetic head assembly as claimed in claim 15 wherein the self
2 pinned AP pinned layer structure comprises:
3 a ferromagnetic first antiparallel (AP) pinned layer;
4 a ferromagnetic second antiparallel (AP) pinned layer;
5 a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP
6 pinned layers;
7 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a
8 positive magnetostriction; and
9 the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to
10 a head surface of the spin valve transistor for self pinning the AP pinned layer structure.

1 17. (Currently Amended) A magnetic head assembly as claimed in claim 16 further
2 comprising:
3 a write head;
4 a read head adjacent the write head;
5 the read head including:
6 ferromagnetic first and second shield layers; and
7 a spin valve transistor located between the first and second shield layers;
8 the spin valve transistor comprising:
9 an emitter;
10 a collector;
11 a base between the emitter and the collector;
12 a spin valve including:
13 a ferromagnetic free layer structure composed of iron (Fe);
14 a self-pinned antiparallel (AP) pinned layer structure;
15 a nonmagnetic spacer layer between the free layer structure and the AP
16 pinned layer structure; and
17 the free layer structure interfacing the spacer layer;
18 the base comprising at least said free layer structure;
19 the self pinned AP pinned layer structure including:
20 a ferromagnetic first antiparallel (AP) pinned layer;
21 a ferromagnetic second antiparallel (AP) pinned layer; and
22 a nonmagnetic antiparallel coupling (APC) layer located between the first and
23 second AP pinned layers;
24 the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;
25 the second AP pinned layer including:
26 an iron (Fe) film;
27 [[said]] a cobalt iron (CoFe) film[[]] with a positive magnetostriction;
28 the iron (Fe) film being located between and interfacing the APC layer and the
29 cobalt iron (CoFe) film; and
30 the CoFe film having a magnetostrictive anisotropy field that is oriented
31 perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned
32 layer structure.
33 the free layer structure being composed of iron (Fe) and interfacing the spacer layer.

1 18. (Withdrawn) A magnetic head assembly as claimed in claim 17 wherein the
2 cobalt iron is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 19. (Currently Amended) A magnetic head assembly as claimed in claim [[18]] 17
2 wherein the cobalt iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 20. (Original) A magnetic head assembly as claimed in claim 19 wherein the first
2 and second AP pinned layers have the same magnetic thickness.

1 21. (Withdrawn) A magnetic head assembly as claimed in claim 16 further
2 comprising:

3 the second AP pinned layer being composed of iron (Fe);

4 the first AP pinned layer including:

5 first and second iron (Fe) films with the first iron (Fe) film interfacing the spacer
6 layer;

7 said cobalt iron (CoFe) film; and

8 the cobalt iron (CoFe) film being located between and interfacing the first and
9 second iron (Fe) film.

1 22. (Withdrawn) A magnetic head assembly as claimed in claim 21 wherein the
2 cobalt iron film is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 23. (Withdrawn) A magnetic head assembly as claimed in claim 22 wherein the cobalt
2 iron film is $\text{Co}_{50}\text{Fe}_{50}$.

1 24. (Withdrawn) A magnetic head assembly as claimed in claim 23 wherein the first
2 and second AP pinned layers have the same magnetic thickness.

1 25. (Original) A magnetic disk drive comprising:
2 at least one magnetic head assembly that has a head surface;
3 the magnetic head assembly having a write head and a read head;
4 the read head including:
5 ferromagnetic first and second shield layers; and
6 a spin valve transistor located between the first and second shield layers;
7 the spin valve transistor comprising:
8 an emitter;
9 a collector;
10 a base between the emitter and the collector;
11 a spin valve including:
12 a ferromagnetic free layer structure;
13 a self-pinned antiparallel (AP) pinned layer structure;
14 a nonmagnetic spacer layer between the free layer structure and the AP pinned layer
15 structure; and
16 the base comprising at least said free layer structure;
17 a housing;
18 a magnetic medium supported in the housing;
19 a support mounted in the housing for supporting the magnetic head assembly with said head
20 surface facing the magnetic medium so that the magnetic head assembly is in a transducing
21 relationship with the magnetic medium;
22 a motor for moving the magnetic medium; and
23 a processor connected to the magnetic head assembly and to the motor for exchanging
24 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

1 26. (Original) A magnetic disk drive as claimed in claim 25 wherein the self pinned
2 AP pinned layer structure comprises:
3 a ferromagnetic first antiparallel (AP) pinned layer;
4 a ferromagnetic second antiparallel (AP) pinned layer;
5 a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP
6 pinned layers;
7 one of the first and second AP pinned layers having a cobalt iron (CoFe) film with a
8 positive magnetostriction; and
9 the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to
10 a head surface of the spin valve transistor for self pinning the AP pinned layer structure.

27. (Currently Amended) A magnetic disk drive as claimed in claim 26 further comprising:

at least one magnetic head assembly that has a head surface;
the magnetic head assembly having a write head and a read head;
the read head including:

ferromagnetic first and second shield layers; and
a spin valve transistor located between the first and second shield layers;
the spin valve transistor comprising:

an emitter;
a collector;
a base between the emitter and the collector;
a spin valve including:

a ferromagnetic free layer structure composed of iron (Fe);
a self-pinned antiparallel (AP) pinned layer structure;
a nonmagnetic spacer layer between the free layer structure and the AP pinned layer structure; and

the free layer structure interfacing the spacer layer;
the base comprising at least said free layer structure;
the self pinned AP pinned layer structure including:

a ferromagnetic first antiparallel (AP) pinned layer;
a ferromagnetic second antiparallel (AP) pinned layer; and
a nonmagnetic antiparallel coupling (APC) layer located between the first and second AP pinned layers;

the first AP pinned layer being composed of iron (Fe) and interfacing the spacer layer;

the second AP pinned layer including:

an iron (Fe) film[[;]] with a positive magnetostriiction;
[[said]] a cobalt iron (CoFe) film;
the iron (Fe) film being located between and interfacing the APC layer and the cobalt iron (CoFe) film; and

the CoFe film having a magnetostrictive anisotropy field that is oriented perpendicular to a head surface of the spin valve transistor for self pinning the AP pinned layer structure;

a housing;
a magnetic medium supported in the housing;

35 a support mounted in the housing for supporting the magnetic head assembly with said head
36 surface facing the magnetic medium so that the magnetic head assembly is in a transducing
37 relationship with the magnetic medium;

38 a motor for moving the magnetic medium; and

39 a processor connected to the magnetic head assembly and to the motor for exchanging
40 signals with the magnetic head assembly and for controlling movement of the magnetic medium.

41 the free layer structure being composed of iron (Fe) and interfacing the spacer layer.

1 28. (Withdrawn) A magnetic disk drive as claimed in claim 27 wherein the cobalt
2 iron is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 29. (Currently Amended) A magnetic disk drive as claimed in claim [[28]] 27
2 wherein the cobalt iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 30. (Original) A magnetic disk drive as claimed in claim 29 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 31. (Withdrawn) A magnetic disk drive as claimed in claim 26 further comprising:
2 the second AP pinned layer being composed of iron (Fe);
3 the first AP pinned layer including:

4 first and second iron (Fe) films with the first iron (Fe) layer film interfacing the
5 spacer layer;

6 said cobalt iron (CoFe) film; and

7 the cobalt iron (CoFe) film being located between and interfacing the first and
8 second iron (Fe) film.

1 32. (Withdrawn) A magnetic disk drive as claimed in claim 31 wherein the cobalt
2 iron is $\text{Co}_{90-50}\text{Fe}_{10-50}$.

1 33. (Withdrawn) A magnetic disk drive as claimed in claim 32 wherein the cobalt
2 iron is $\text{Co}_{50}\text{Fe}_{50}$.

1 34. (Withdrawn) A magnetic disk drive as claimed in claim 33 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 35. (New) A spin valve transistor as claimed in claim 9 wherein the base further
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 36. (New) A spin valve transistor as claimed in claim 35 further comprising a barrier
2 layer located between the emitter and the base for conducting hot electrodes from the emitter to the
3 base wherein the hot electrons have an energy level above Fermi levels of the layers in said
4 base.

1 37. (New) A spin valve transistor as claimed in claim 36 wherein the first and second
2 AP pinned layers have the same magnetic thickness.

1 38. (New) A magnetic head assembly as claimed in claim 19 wherein the base further
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 39. (New) A magnetic head assembly as claimed in claim 38 further comprising a
2 barrier layer located between the emitter and the base for conducting hot electrodes from the
3 emitter to the base wherein the hot electrons have an energy level above Fermi levels of the layers
4 in said base.

1 40. (New) A magnetic head assembly as claimed in claim 39 wherein the first and
2 second AP pinned layers have the same magnetic thickness.

1 41. (New) A magnetic disk drive as claimed in claim 29 wherein the base further
2 comprises the self-pinned antiparallel (AP) pinned layer structure and the spacer layer.

1 42. (New) A magnetic disk drive as claimed in claim 41 further comprising a barrier
2 layer located between the emitter and the base for conducting hot electrodes from the emitter to the
3 base wherein the hot electrons have an energy level above Fermi levels of the layers in said
4 base.

1 43. (New) A magnetic disk drive as claimed in claim 42 wherein the first and second
2 AP pinned layers have the same magnetic thickness.